

Fast Neutron Dosimeter for the Space Environment, Phase II

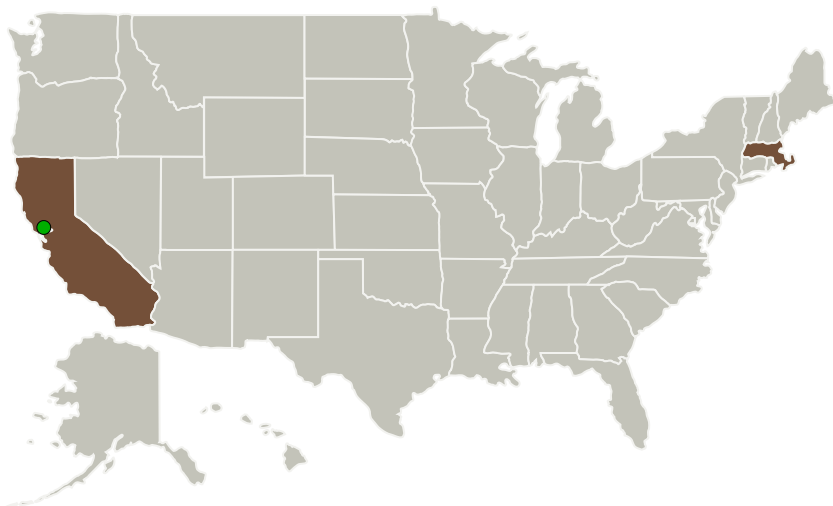
Completed Technology Project (2011 - 2013)



Project Introduction

Model calculations and risk assessment estimates indicate that secondary neutrons, with energies ranging between 0.5 to >150 MeV, make a significant contribution to the total absorbed dose received by space crews during long duration space missions [1-3]. Advanced scintillation materials, which exhibit radiation type and mass dependent emission times, coupled to SSPM detectors, provide the optimum volume to payload performance and the ability to easily discriminate between the fraction of dose, which results from secondary neutrons, and that which results from exposure to energetic charged particles and background gamma-rays. The Phase-1 effort successfully characterized the critical components of the proposed dosimeter, specifically, the response of the scintillation material to irradiation by gamma-rays, protons, and neutrons, as well as the performance of the SSPM detector. The Phase-1 modeling studies provide a critical foundation for assessing the anticipated signals in the space radiation environment. The proposed dosimeter would overcome many of the limitations in the current generation of neutron dosimeters, and would provide baseline information on the physics, needed with the information from biological studies, to assess risk in future human-space-exploration missions to the moon and Mars.

Primary U.S. Work Locations and Key Partners



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Organizations Performing Work	Role	Type	Location
Radiation Monitoring Devices, Inc.	Lead Organization	Industry	Watertown, Massachusetts
● Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations	
California	Massachusetts

Project Transitions

▶ **June 2011:** Project Start

✓ **May 2013:** Closed out

Closeout Documentation:

- Final Summary Chart(<https://techport.nasa.gov/file/138861>)

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Radiation Monitoring Devices, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

Carlos Torrez

Principal Investigator:

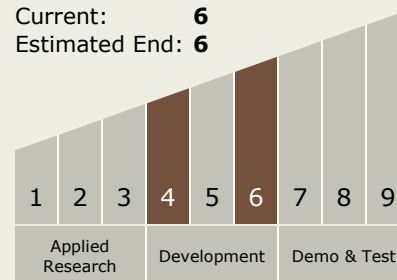
James Christian

Technology Maturity (TRL)

Start: 4

Current: 6

Estimated End: 6



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Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
 - └ TX06.5 Radiation
 - └ TX06.5.5 Monitoring Technology

Target Destinations

Earth, The Moon, Others Inside the Solar System, Outside the Solar System, The Sun, Mars